Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Comparative Evaluation of Topical Chlorhexidine Gluconate Gel and Povidone Iodine Ointment as an Adjunct to Initial Therapy of Chronic Periodontitis

Arun Sivadas[1], Preeja C[2], Presanthila Janam[3]

[1]Consultant Periodontist and Implantologist, Department of Dentistry, Sree Gokulam Medical College and Research Foundation, Venjaramoodu, Thiruvananthapuram, Kerala, India, [2]Associate Professor, Department of Dentistry, Sree Gokulam Medical College and Research Foundation, Venjaramoodu, Thiruvananthapuram, Kerala, India, [3]CDE Director and Professor, PMS College of Dental Science and Research, Vattappara, Thiruvananthapuram, Kerala, India

Abstract

Background: The aim of the present controlled clinical study was the comparative evaluation of topical chlorhexidine (CHX) gluconate gel and Povidone-iodine (PVP I) ointment as adjuncts to initial therapy of chronic periodontitis.

Methods: 29 patients with a total of 85 sites diagnosed with chronic periodontitis were included in the study. Sites were treated either with sub gingival scaling and CHX gluconate gel 1% (Scaling and root planning [SRP] + CHX group, *n* = 30) or sub gingival scaling and PVP I ointment 5% (SRP + PVP I group, *n* = 30). Control sites were treated by conventional subgingival scaling only (Control group, *n* = 25).

Results: The mean probing pocket depth reduction at 6 weeks was 2.40 ± 0.50 mm for SRP + PVP I group, 2.16 ± 0.62 for SRP + CHX group, and 1.32 ± 0.55 mm for control group. The mean clinical attachment gain at 6 weeks was 2.12 ± 0.78 mm for SRP + PVP I group, 2.08 ± 0.49 for SRP + CHX group, and 1.16 ± 0.68 mm for control group. The change in indices between all the three groups was not statistically significant.

Conclusion: Within the limits of this study, it is concluded that treatment with sub gingival scaling and PVP I ointment 5% and CHX gluconate gel 1% lead to a significantly more favorable clinical response compared to conventional subgingival scaling only. Even though statistically not significant, sites using PVP I gave a slightly better response compared to CHX gluconate.

Key words: Chlorhexidine gluconate gel, Povidone iodine ointment, Chronic periodontitis, Pocket depth, Clinical attachment gain

INTRODUCTION

Periodontal diseases are considered as infections of the periodontium, caused by oral microorganisms growing in dental plaque in gingival and subgingival periodontal niches. Putative pathogens associated with periodontal disease are susceptible to a variety of antiseptics and antibiotics.

Access this article online

www.ijss-sn.com

Month of Submission : 06-2021
Month of Peer Review : 07-2021
Month of Acceptance : 07-2021
Month of Publishing : 08-2021

The initial periodontal therapy includes reduction and elimination of etiological factors in periodontal treatment achieved mainly by complete removal of local etiologic factors. Studies suggest that initial therapy is as effective as surgical procedure in arresting destructive periodontitis. A cohort study by Hujoel *et al.* suggests that non-surgical periodontal therapy may be associated with a substantial reduction in tooth mortality.[1] According to studies by Mercanoglu *et al.*, endothelial functions were impaired in patients with chronic periodontitis and that they improve following initial periodontal therapy.[2] Takamatsu *et al.* indicate that initial conventional therapy can eliminate *Bacteroides forsythus* and *Porphyromonas gingivalis*.[3]

An important mode of bacterial elimination is administration of local and systemic antibiotics. Routine use of systemic

Corresponding Author: Dr Preeja C, Associate Professor, Department of Dentistry, Sree Gokulam Medical College and Research Foundation, Venjaramoodu, Thiruvananthapuram, Kerala, India.

antibiotics over long periods of time is contraindicated because of the development of resistant strains and possible systemic side effects.[4] Here lies the importance of delivering antimicrobials site specifically. The use of locally delivered antimicrobials in addition to initial therapy is a relatively new addition in the management of periodontitis. This type of system is being applied to local periodontal therapy, in which the drugs are directly administered to the periodontopathogenic bacteria.[5] By this approach, it becomes possible to produce the maximum effect with minimal dose of antibiotics.

Because the periodontal pocket is relatively inaccessible, various techniques are being developed to deliver the antibacterial agents to the periodontal pocket, such as intrapocket irrigation and intrapocket sustained release delivery systems.

In a developing country with a high prevalence of periodontitis, cost-effective treatment option is preferred and if periodontitis can be controlled by such a cost effective treatment approach, it can be accepted as a routine strategy. Localized delivery of antimicrobials is such a kind of treatment option. The various treatment approaches include, irrigation, placement of chips, fibers, and gels into the periodontal pockets. The antimicrobials used include chlorhexidine (CHX), tetracycline, doxycycline, minocycline, and Povidone-iodine (PVP I). Of these, CHX gluconate and PVP I have been selected for the present study. The studies of CHX[4,6-9] and PVP I[10-13] show a beneficial effect in periodontal infections. The aim of the present controlled clinical trial was to assess and compare the clinical response following adjunctive site specific antimicrobial therapy. In the present study, the effectiveness of multiple subgingival applications of 1% CHX gluconate gel (Hexigel®) and 5% PVP I ointment (Betadine®) is critically evaluated as adjuncts to initial periodontal debridement in chronic periodontitis cases.

Aims and Objectives

The objectives are as follows:

1. To evaluate the clinical efficacy of sub gingival application of 1% CHX gluconate gel as adjunct to initial periodontal therapy compared to periodontal debridement alone.
2. To evaluate the clinical efficacy of sub gingival application of 5% PVP I ointment as adjunct to initial periodontal therapy compared to periodontal debridement alone.
3. To compare the effects of sub gingival application of CHX gluconate gel and PVP I ointment as adjunct to initial periodontal therapy, in periodontal tissue healing.

MATERIALS AND METHODS

Study Population and Design

This study was conducted in the Department of Periodontics, Government Dental College, Trivandrum. 29 non-smoking patients, 12 males and 17 females (aged between 29 and 47 years) with chronic periodontitis were included in the study.

Inclusion Criteria

The following criteria were included in the study:

- Patients with mild to severe chronic periodontitis having probing depth up to 6 mm
- Good general health according to medical history, blood pressure, pulse rate, and clinical judgment
- Negative for hypersensitivity to CHX or PVP I
- No known systemic disorders
- Patients who are willing and to be able to return for multiple follow-up visits
- Single rooted teeth with involvement of one or two surfaces.

Exclusion Criteria

The following criteria were excluded from the study:

- Patients with uncontrolled systemic diseases
- History of previous periodontal treatment and medication
- History of antibiotic treatment for the past 6 months
- Patients with the habit of smoking
- Patients allergic to PVP I and/or CHX
- Pregnant and lactating mothers
- Tooth with mobility.

Ethical Clearance

Human Ethical Committee, Medical College, Thiruvananthapuram has given approval for the study.

Study Design

Subjects presenting for treatment were provided information about the study and informed consent was obtained before starting the study. Simple randomized procedure was used and tooth was taken as randomizing unit. Strict oral hygiene instructions (OHI) were given. After 1 week, patients were recalled for evaluation of periodontal status. Only those patients, who, following the hygiene treatment phase, documented willingness and ability, to maintain optimal oral hygiene were included in the study. Ninety sites were treated in the test and control groups, of which there were five dropouts in control.

Clinical Measurements

The necessary patient details including clinical parameters such as Probing Pocket Depth (PPD), Clinical Attachment Level (CAL), Gingival Index (GI), and Modified Sulcus

Bleeding Index (mSBI) were recorded in the proforma after selection of appropriate sites. Repeated OHI, consisting of Bass brushing technique and regarding the correct use of dental floss and an interdental brush, were given to all participants when they initially underwent scaling and root planning (SRP). All patients were provided with the same tooth paste and tooth brush. The same OHI were further reinforced throughout the study. Finally, subjects were not allowed to take any antibiotics and anti-inflammatory drugs, or CHX based mouth rinses, during the entire length of the study.

Treatments

After 1 week of supra gingival scaling, the sites from each patient, who maintain good oral hygiene, were randomly assigned to one of the following treatment regimens.

Periodontal Debridement Only (SRP)

The sites received two sessions of subgingival scaling with 1 week interval between the sessions.

Periodontal Debridement + Application of 1% CHX Gluconate Gel (SRP + CHX)

The sites received two sessions of supra and sub gingival scaling followed by sub gingival application of 1% CHX gluconate gel (Hexigel®. ICPA Healthcare Ltd.) using a syringe and needle until excess material comes out of the gingival margin, in both sessions.

Periodontal Debridement + Application of 5% PVP I Ointment (SRP + PVP-I)

The sites received two sessions of supra and sub gingival scaling followed by sub gingival application of 5% PVP I ointment (Betadine®. Win Medicare Ltd.) using a syringe and needle until excess material comes out of the gingival margin, in both sessions.

Clinical monitoring was performed at the day 0 (baseline), day 7, day 21, and day 42.

Statistics

Data analyses were performed using the software, Statistical Package for the Social Sciences (SPSS Version 10) after feeding the data into a Personal Computer. The changes over time of clinical parameters, PPD and Clinical Attachment Level were recorded in millimeters and mSBI, GI and plaque index were recorded as grading's. PPD and Clinical Attachment Level were found following the distribution normality, in the normal probability plot. Therefore, the parametric test One-way ANOVA, comparing treatments at baseline was used along with the post-hoc test, Duncan's Multiple Range (DMR) test to assess the statistical significance among the different parameters of the test and control groups. mSBI and GI were not found following the distribution normality, using the normal probability plot. Therefore, non-parametric test, that is, Kruskal–Wallis test comparing treatments at baseline was used along with the *post hoc* test Mann–Whitney U-test to assess the statistical significance among the different parameters of the test and control groups. Statistical significance was declared if "*P*" value was found ≤0.05.

RESULTS AND OBSERVATIONS

The study population consisted of 31 patients with chronic periodontitis between ages of 29 and 47, with PPDs of ≤6 mm of which 14 were males and 17 were females, of which, two patients discontinued from the study due to personal reasons. The remaining 29 patients included in test and control groups followed the OHI given and maintained an acceptable level of oral hygiene throughout the study period.

Baseline Values

Baseline analysis showed no significant differences between the three groups for any of the variables assessed, suggesting that final differences between treatments were not influenced by initial site characteristics, thus allowing post-treatment results to be compared [Tables 1 and 2] and [Charts 1 and 2]. The difference in the baseline measurements among the various groups was not found to be statistically significant ($P > 0.05$).

Table 1: Comparison of mean baseline PPD and CAL in the three study groups

Parameter	Material	Mean (mm)	±SD	F value	P value
Probing Pocket Depth (PPD)	Control (SRP)	4.92[a]	0.86	0.441	>0.05
	SRP+CHX	4.90[a]	0.75		
	SRP+PVP I	4.73[a]	0.86		
Clinical Attachment Level (CAL)	Control (SRP)	5.28[a]	1.13	0.847	>0.05
	SRP+CHX	5.57[a]	1.38		
	SRP+PVP I	5.17[a]	1.12		

P>0.05 - Not Significant; a - Means with same superscript do not differ each other (Duncan's Multiple Range Test). PPD: Probing pocket depth, CAL: Clinical attachment loss, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Table 2: Comparison of mean baseline mSBI, GI, and PI in the three study groups

Parameter	Material	Mean	±SD	Median	H value	*P* value
Modified Sulcus Bleeding Index (mSBI)	Control (SRP)	1.60[a]	0.57	2.00	1.109	>0.05
	SRP+CHX	1.40[a]	0.49	1.00		
	SRP+PVP I	1.20[a]	0.41	1.00		
Gingival Index (GI)	Control (SRP)	2.00[a]	0.00	2.00	0.843	>0.05
	SRP+CHX	1.97[a]	0.18	2.00		
	SRP+PVP I	1.97[a]	0.18	2.00		

P>0.05 - Not Significant; a - Means with same superscript do not differ each other (Duncan's Multiple Range Test). PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Control Group

Comparison between baseline and 6 weeks follow-up demonstrated significant improvements in all the parameters ($P < 0.001$) [Tables 5 and 6] and [Charts 5 and 6].

SRP + CHX Group

Comparison between baseline and 6 weeks demonstrated very highly significant improvements in all the parameters ($P < 0.001$) [Tables 7 and 8] and [Charts 7 and 8].

SRP + PVP I Group

Comparison between baseline and 6 weeks follow-up demonstrated very highly significant improvements in all the parameters ($P < 0.001$) [Tables 9 and 10] and [Charts 9 and 10].

PPD Reduction

The ANOVA revealed no differences for PPD between the treatment groups at baseline ($P > 0.05$). At baseline, the mean PPD varied between 4.73 mm to 4.92 mm and at 6 weeks, it varied from 2.30 mm to 3.60 mm [Tables 1 and 3] and [Charts 1 and 3]. The analysis of variance showed a significant change of probing depths at all sites over time. Within all treatment groups, there was a significant change when baselines to 6 weeks recordings were compared. Comparison of mean 6 weeks mSBI, GI

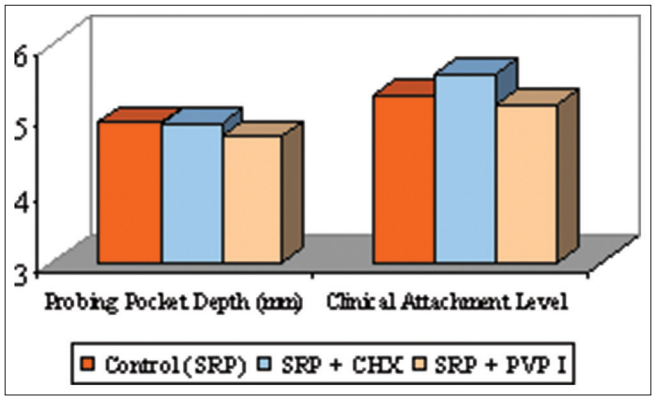

Chart 1: Comparison of mean baseline probing pocket depth and clinical attachment level for different materials at baseline observations

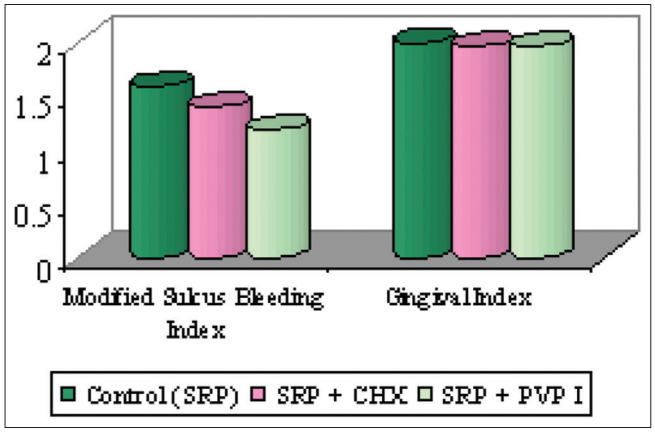

Chart 2: Comparison of mean baseline Modified Sulcus Bleeding Index, Gingival Index and Plaque for different materials at baseline observations

Table 3: Comparison of mean 6 weeks PPD and CAL in the three study groups

Parameter	Material	Mean (mm)	±SD	F value	*P* value
Probing Pocket Depth (PPD)	Control (SRP)	3.60^{c}	0.96	18.775	<0.001
	SRP+CHX	2.83^{b}	0.75		
	SRP+PVP I	2.30^{a}	0.65		
Clinical Attachment Level (CAL)	Control (SRP)	4.12^{b}	1.36	5.011	<0.001
	SRP+CHX	3.57^{ab}	1.25		
	SRP+PVP I	3.07^{a}	1.08		

P<0.001: Highly Significant; a,b,c - Means with same superscript do not differ each other (Duncan's Multiple Range Test). PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Table 4: Comparison of mean 6weeks mSBI, GI and PI in the three study groups

Parameter	Material	Mean	±SD	Median	H value	*P* value
Modified Sulcus Bleeding Index (mSBI)	Control (SRP)	0.40^{b}	0.30	0.00	8.316	<0.05
	SRP+CHX	0.40^{b}	0.39	0.00		
	SRP+PVP I	0.10^{a}	0.03	0.00		
Gingival Index (GI)	Control (SRP)	1.00^{b}	0.41	1.00	10.969	<0.01
	SRP+CHX	0.93^{b}	0.63	1.00		
	SRP+PVP I	0.50^{a}	0.29	0.00		

P<0.05: Significant; *P*<0.01: Highly Significant; a, b, c - Means with same superscript do not differ each other (Duncan's Multiple Range Test). PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Table 5: Comparison of mean changes in PPD and CAL in the SRP group over 6 week period

Parameter	Period	Mean (mm)	±SD	t value	*P* value
Probing Pocket Depth (PPD)	Baseline	4.92	0.86	3.125	<0.05
	6th Week	3.60	0.95		
Clinical Attachment Level (CAL)	Baseline	5.28	1.13	2.266	<0.05
	6th Week	4.12	1.36		

P<0.05: Significant. PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Table 6: Comparison of mean changes in mSBI, GI, and PI in the SRP group over 6 week period

Parameter	Period	Mean	±SD	Median	U value	*P* value
Modified Sulcus Bleeding Index (mSBI)	Baseline	1.60	0.57	2.00	25.00	<0.05
	6th Week	0.40	0.30	0.00		
Gingival Index (GI)	Baseline	2.00	0.00	2.00	15.00	<0.05
	6th Week	1.00	0.41	1.00		

P<0.05: Significant; *P*<0.01: Highly Significant. PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

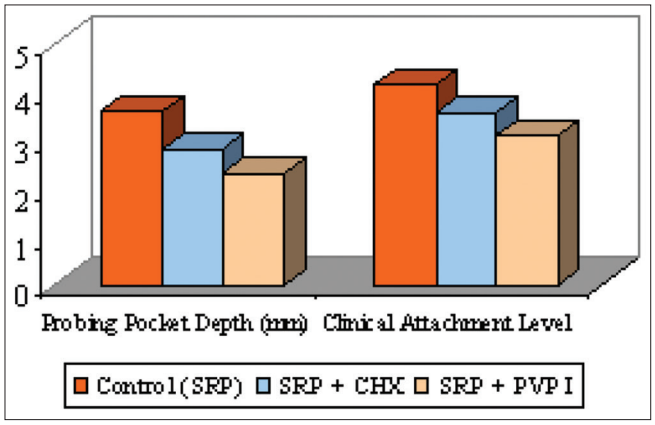

Chart 3: Comparison of mean value of probing pocket depth and clinical attachment level for different materials at 6th week observations

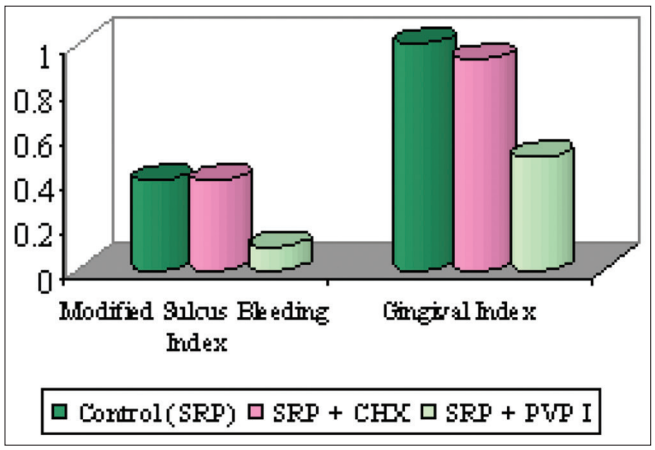

Chart 4: Comparison of mean value of Modified Sulcus Bleeding Index, Gingival Index and Plaque Index for different materials at 6th week observations

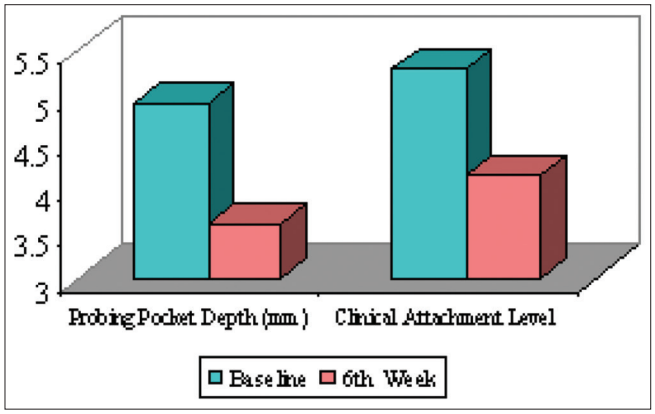

Chart 5: Comparison of mean value of probing pocket depth and clinical attachment level baseline and 6th week observations

and PI was also recorded in the three study groups [Table 4 and Chart 4].

Statistically significant reduction in probing depth was found between SRP + CHX group and control group; and SRP + PVP I group and control group at 6 weeks. No significant difference was observed between SRP + CHX group and SRP + PVP I group at 6 weeks [Table 11 and Chart 11].

Table 7: Comparison of Mean changes in PPD and CAL in the SRP+CHX group over 6 week period

Parameter	Period	Mean (mm)	±SD	t value	*P* value
Probing Pocket Depth (PPD)	Baseline	4.90	0.75	10.633	<0.001
	6th Week	2.83	0.74		
Clinical Attachment Level (CAL)	Baseline	5.57	1.38	5.878	<0.001
	6th Week	3.57	1.25		

P<0.001: Very highly significant. PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Table 8: Comparison of mean changes in mSBI, GI, and PI in the SRP+CHX group over 6 week period

Parameter	Period	Mean	±SD	Median	U value	*P* value
Modified Sulcus Bleeding Index (mSBI)	Baseline	1.40[a]	0.49	1.00	108.00	<0.001
	6th Week	0.40[b]	0.39	0.00		
Gingival Index (GI)	Baseline	1.97[a]	0.18	2.00	115.50	<0.001
	6th Week	0.93[b]	0.63	1.00		

P<0.001: Very highly significant. PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Table 9: Comparison of mean changes in PPD and CAL in the SRP+PVP I group over 6 week period

Parameter	Period	Mean (mm)	±SD	t value	*P* value
Probing Pocket Depth (PPD)	Baseline	4.73	0.86	12.279	<0.001
	6th Week	2.30	0.65		
Clinical Attachment Level (CAL)	Baseline	5.17	1.11	7.402	<0.001
	6th Week	3.07	1.08		

P<0.001: Very highly significant. PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Table 10: Comparison of mean changes in mSBI, GI and PI in the SRP+PVP I group over 6 week period

Parameter	Period	Mean	±SD	Median	U value	*P* value
Modified Sulcus Bleeding Index (mSBI)	Baseline	1.20[a]	0.41	1.00	36.00	<0.001
	6th Week	0.10[a]	0.03	0.00		
Gingival Index (GI)	Baseline	1.97[a]	0.18	2.00	36.50	<0.001
	6th Week	0.50[a]	0.29	0.00		

P<0.001: Very highly significant. PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Clinical Attachment Gain

The clinical attachment level was not significantly different between the treatment groups ($P > 0.05$) [Table 1]. At

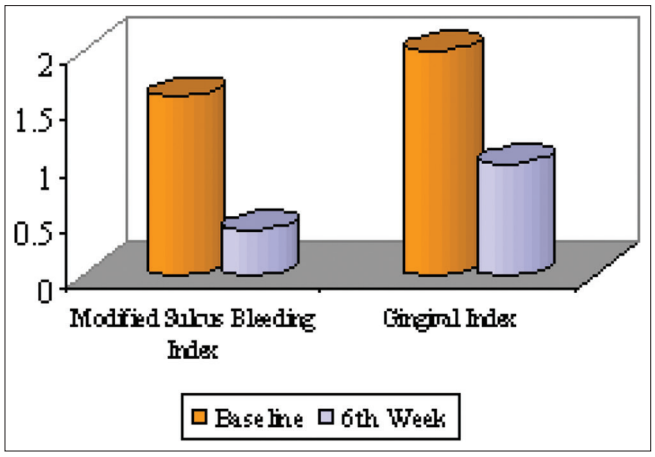

Chart 6: Comparison of mean value of Modified Sulcus Bleeding Index, Gingival Index and Plaque Index at baseline and 6th week observations

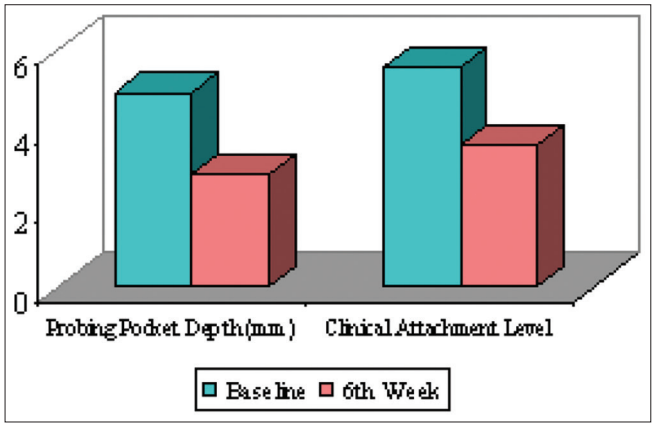

Chart 7: Comparison of mean time period value of probing pocket depth and clinical attachment level for scaling and root planning + Chlorhexidine at baseline and 6th week observations

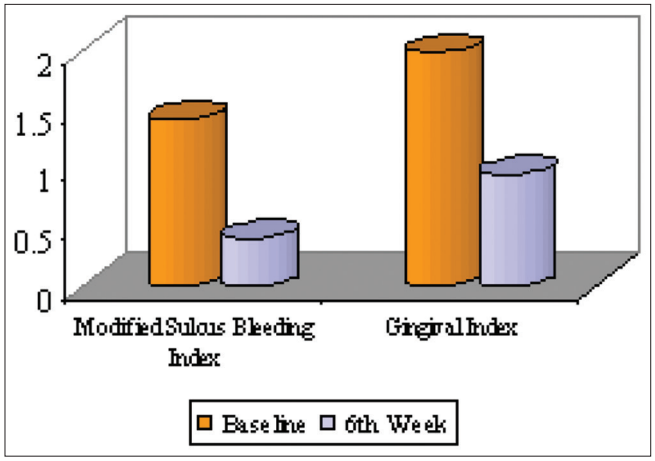

Chart 8: Comparison of mean time period value of Modified Sulcus Bleeding Index, Gingival Index and Plaque Index for scaling and root planning + Chlorhexidine group over 6th week observations

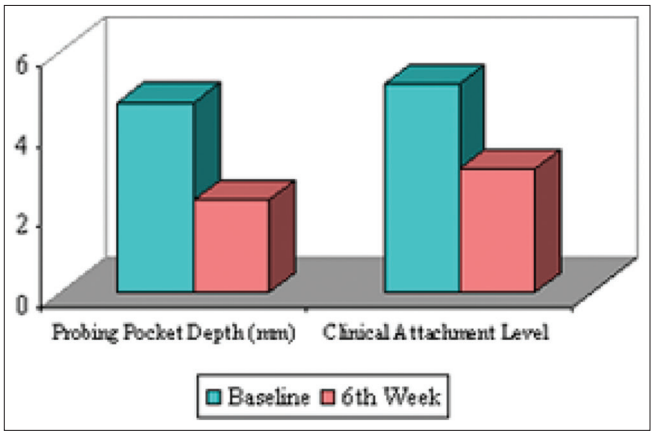

Chart 9: Comparison of mean time period values of probing pocket depth and clinical attachment level for scaling and root planning + Povidone-iodine at baseline and 6th week observations

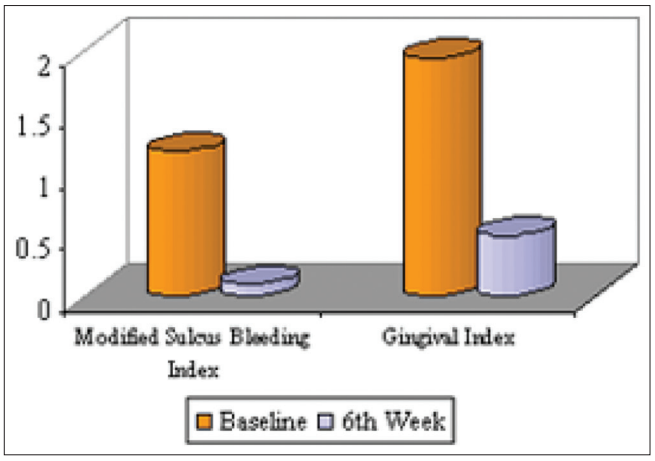

Chart 10: Comparison of mean time period values of Modified Sulcus Bleeding Index, Gingival Index and Plaque Index for scaling and root planning + Povidone-iodine at baseline and 6th week observations

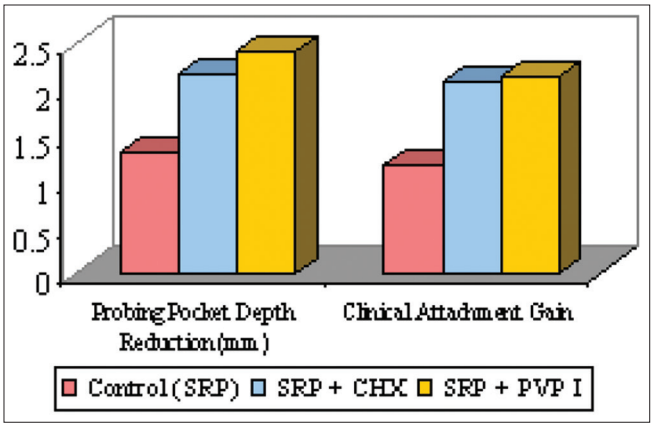

Chart 11: Comparison of Mean differences probing pocket depth and clinical attachment level for different materials at baseline and 6th week observations

baseline, clinical attachment level varied between 5.17 mm to 5.28 mm and at 6 weeks, it varied from 3.07 mm to 4.12 mm [Tables 1 and 3]. The analysis of variance revealed that there was a significant change of the attachment level over time.

Table 11: Comparison of Mean PPD reduction and clinical attachment gain between the three groups at 6 weeks

Parameter	Material	Mean Difference (mm)	±SD	F value	*P* value
Probing Pocket Depth Reduction	Control (SRP)	1.32[a]	0.55	25.389	<0.001
	SRP+CHX	2.16[b]	0.62		
	SRP+PVP I	2.40[b]	0.50		
Clinical Attachment Gain	Control (SRP)	1.16[a]	0.68	16.673	<0.001
	SRP+CHX	2.08[b]	0.49		
	SRP+PVP I	2.12[b]	0.78		

P<0.001: Very highly significant; a,b - Means with same superscript do not differ each other (Duncan's Multiple Range Test). PPD: Probing pocket depth, CAL: Clinical attachment loss, mSBI: Modified sulcus bleeding Index, GI: Gingival Index, PI: Plaque Index, SRP: Scaling and root planning, CHX: Chlorhexidine, PVP I: Povidone-iodine

Statistically significant clinical attachment gain was found between SRP + CHX group and control group; and SRP + PVP I group and control group at 6 weeks. No significant difference was observed between SRP + CHX group and SRP + PVP I group at 6 weeks [Table 11]. The change in indices between all the three groups was not statistically significant.

DISCUSSION

The present study was initiated following encouraging reports describing the effect of local drug application on chronic adult periodontal disease. The difference in the baseline measurements among the various groups was not found to be statistically significant. All the three treatment modalities were effective in significantly improving the clinical parameters between baseline and 6 weeks. There were statistically significant improvements in PPD, Clinical attachment level, mSBI, and GI following the 6 week period.

Control Group

The SRP only group, consisting of 25 treatment sites, showed a mean probing depth (PPD) reduction of 1.32 ± 0.55 mm at 6 weeks. The results are comparable to studies by Hoang *et al*. 2003,[14] reported a PD reduction of 1.6 mm after SRP. This is better compared to studies by Garrett *et al*. 1999,[15] who reported a mean PPD reduction of 0.9 mm, 9 months after SRP. It may be due to the inability of maintaining the probing depth reduction over long duration. The present result is inferior compared to Zanatta *et al*. 2006,[16] who reported a PD reduction of 2.51 ± 0.52 mm after SRP. The gain in clinical attachment level (CAL gain) in the SRP group at 6 weeks was 1.16 ± 0.68 mm. This is better compared to studies by Garrett *et al*. 1999,[15] who reported a mean CAL gain of 0.7 mm over 9 months and Brochut *et al*. 2005[17] (0.91 ± 1.21 mm). The present result is slightly less compared to CAL gain obtained by Zanatta *et al*. 2006,[16] who reported a CAL gain of 1.87 ± 0.56 mm after SRP. The mean value of mSBI changed from 1.60 ± 0.57 at baseline to 0.40 ± 0.30 postoperatively. Similarly, GI changed from 2.00 ± 0.00 to 1.00 ± 0.41 in 6 weeks. Both the changes were statistically significant ($P < 0.05$).

SRP + CHX group

This group, consisting of 30 treatment sites, also showed better clinical parameters when compared to SRP alone in the management of periodontitis. Similar results were obtained by Fine *et al*. (1994) regarding subgingival irrigation of CHX.[18] Piccolomini *et al*. (1999) have reported clinical and microbiological benefits after subgingival administration of CHX gluconate as an alternative to SRP.[19] The SRP + CHX group showed a mean probing depth (PPD) reduction of 2.16 ± 0.62 mm at 6 weeks. This result is better compared to studies by Unsal *et al*. 1994,[20] who reported a PPD reduction of 1.58 mm. This may be probably due to the single baseline application of the 1% CHX gel. The present result is inferior compared to studies by Vinholis *et al*. 2001,[21] who reported a PPD reduction of 3.36 mm after 1 time weekly application of 1% CHX collagen gel along with SRP for 4 weeks. The better result may be due to the more number of applications of the agent and also due to the selection of deeper pockets for the study, as the deeper the probing depth, better will be the reduction. The gain in clinical attachment level (CAL gain) in the SRP + CHX group at 6 weeks was 2.08 ± 0.49 mm. This result is better compared to studies by Unsal *et al*. 1994,[20] who reported a CAL gain of 0.70 mm, which may be due to the 1 time application of the gel. The present result is inferior compared to studies by Vinholis *et al*. 2001,[21] who reported a CAL gain of 2.97mm, which may be due to the multiple gel applications. There was a significant change in mSBI. From baseline reading, the mean value changed from 1.40 ± 0.49 to 0.40 ± 0.39 at the end of 6 weeks ($P < 0.001$). The change in GI was also significant in 6 weeks. It changed from a mean value of 1.97 ± 0.18 at in the beginning to 0.93 ± 0.63 postoperatively ($P < 0.001$).

SRP + PVP I Group

The SRP + PVP I group, consisting of 30 treatment sites, showed a mean PPD reduction of 2.40 ± 0.50 mm at 6 weeks. This finding is in accordance with the PPD reduction obtained by Zanatta *et al*. 2006[16] who reported a Probing depth reduction of 2.53 ± 0.50 mm after 0.5% PVP I irrigation along with periodontal debridement. The results obtained are better compared to the studies by Hoang *et al*. 2003[14] who got a mean pocket depth reduction of 1.8 mm following SRP combined with subgingival irrigation of 10% PVP-iodine. The better results in the present study may be due to the gel like consistency of PVP I in the present study, which allows more contact period with the diseased

site allowing more beneficial effect. The gain in clinical attachment level (CAL gain) in the SRP + PVP I group at 6 weeks was 2.12 ± 0.78 mm. This is similar to the readings obtained by Zanatta *et al*. 2006 [17] (1.94 ± 0.70 mm). The results obtained are worse compared to reading by Rosling *et al*. 1986[22] who reported a CAL gain of ≥3 mm after periodontal debridement and 0.5% PVP I irrigation. This may be due to the fact that PVP I is more effective when it is in diluted preparations. There was a significant reduction in mSBI values. The mean value changed from 1.20 ± 0.41 at baseline to 0.10 ± 0.03 in 6 weeks ($P < 0.001$). There was also a reduction in GI values in 6 weeks of the study. It changed from 1.97 ± 0.18 at baseline to 0.50 ± 0.29 at the end of the study ($P < 0.001$).

Inter-group Comparison

This was a parallel design study in order to disclose true differences between treatment modalities which may be associated with a considerable carry over effect. If a split mouth design was used, the wash-out antimicrobial agents through saliva could affect the microbial flora in study sites that received other treatments. This, in addition to boosting the systemic response due to removal of antigenic challenge or the inoculation effect following mechanical instrumentation, could mask true differences between groups if a split-mouth design was used.

Reduction in pocket depth may be the most important outcome of any periodontal procedure, including periodontal debridement because it directly affects the ability of the clinician to maintain a treated site. In the present study, PPD was significantly reduced following the treatments in each experimental group. After mechanical instrumentation, PPD reduction results from gingival recession and gain of clinical attachment. The main difference in the treatment response for deeper and shallower pockets seemed to result from shrinkage of the soft-tissue wall of the deeper pockets. This is consistent with findings in non-surgical therapy studies by Badersten *et al*. (1981).[23]

Intergroup comparison of 6 weeks post-operative value shows statistically significant difference in the PPD reduction and clinical attachment level between the SRP + PVP I group and SRP + CHX group compared to the SRP group. This implies that both the test materials are effective modes of therapy compared to SRP alone in the management of chronic periodontitis. PPD reduction and CAL gain between the SRP + CHX group and SRP + PVP I group were not found to be statistically significant. Delivery of PVP I ointment 5% in addition to SRP resulted in only a slightly better PPD reduction and CAL gain compared to delivery of CHX gluconate gel 1% in addition to SRP. The slightly greater PPD reduction/CAL gain observed in PVP I group may be explained probably by the broad spectrum of activity of PVP I.

The reduction in indices ranged from SRP + PVP-I group to SRP + CHX group and to SRP group in the descending order. Even though, there were changes, which are statistically significant in all three groups, from baseline to 6 weeks, the intergroup comparison showed that the changes in indices were not statistically significant between the three groups. This showed that there may not be relevant effect of these antimicrobials in the change of indices.

For the CHX gluconate and PVP I groups, there was a reduction of parameters in the end of study with no statistically significant differences between the groups. The SRP group, however, showed relatively small differences between baseline and 6 week observations. Some of the treated sites, however, responded more favorably than others. It is at present unclear why the treatment response was divergent. It may be because of the differences in root surface morphology and the characteristics of the periodontal pocket. Future studies including greater numbers of treated sites should focus on this aspect to arrive at more predictable treatment strategies.

The results of the present study have shown that both SRP and SRP in combination with site specific delivery of antimicrobials are effective in treating chronic periodontitis. However, SRP in combination with either CHX gluconate or PVP I showed a better treatment option when compared to SRP alone (Even though PVP I is seen slightly better compared to CHX gluconate, the difference is not statistically significant). From this finding, it can be assumed that the antimicrobial adjuncts used in the study may have resulted in change in the quality or quantity inside the pockets resulting in better clinical response compared to SRP alone. Therefore, either of these therapies can be used successfully in managing chronic periodontitis cases.

Although a significant improvement was achieved as a result of scaling alone, this was lower than would be expected if performed on an "untreated" periodontitis population. Usually, following the initial treatment, a marked probing reduction and shrinkage occurs due to the elimination of subgingival plaque, calculus, and other plaque retentive factors. Therefore, somewhat less improvement could be expected from the SRP alone if some of these factors have already been reduced by initial scaling. The need for detailed microbiological study persists substantiate the clinical findings observed. Hence, in the future, it may be suggested that microbiological studies should include the aerobic and anaerobic culturing of the microorganisms and the methods to identify the individual strains of bacteria.

CONCLUSIONS

The present study suggests a comprehensive approach to antimicrobial periodontal therapy. The following conclusions were drawn from the study:

- The results show that 5% PVP I ointment as adjunct to initial periodontal therapy of chronic periodontitis is an effective treatment method when compared to SRP alone.
- 1% CHX gluconate gel as adjunct to initial therapy is also beneficial in the treatment of chronic periodontitis.
- Antimicrobial agent generally applied to oral soft tissues (CHX gluconate) is effective when delivered subgingivally.
- Antiseptic agent which is used generally in the body (PVP I) is effective in the local periodontal therapy.
- When comparing CHX gluconate gel and PVP I ointment, the latter is slightly better (but statistically not significant), when examining the clinical parameters.
- Subgingival delivery of both the gel and ointment studied demonstrated a benign safety profile with no major, common, untoward allergic, local, or systemic effects.

The results of the present study revealed that the topical application of the 5% PVP I ointment and 1% CHX gluconate gel gave almost similar clinical augmentative effects when compared to subgingival SRP alone. The investigation lasted only for 6 weeks, and the clinical importance of these improvements and their possible influence on long-term results is at present unclear. It seems conceptually incorrect to introduce therapies that mainly improve the condition of the surrounding soft tissues without due attention to the diseased root surfaces. Sub gingival drug therapy should, therefore, always be applied as a supplement to a meticulous mechanical cleaning of the diseased root surface areas. The possibility of augmenting the healing of such sites by antibacterial drugs or drug combinations should be further evaluated.

REFERENCES

1. Hujoel PP, Leroux BG, Selipsky H, White BA. Non-surgical periodontal therapy and tooth loss. A cohort study. J Periodontol 2000;71:736-42.
2. Mercanoglu F, Oflaz H, Öz O, Gökbuget AY. Endothelial dysfunction in patients with chronic periodontitis and its improvement after initial periodontal therapy. J Periodontol 2004;75:1694-700.
3. Takamatsu N, Yano K, He T, Ishikawa I. Effect of initial periodontal therapy on the frequency of detecting *Bacteroides forsythus*, *Porphyromonas gingivalis*, and *Actinobacillus actinomycetemcomitans*. J Periodontol 1999;70:574-80.
4. Herrera D, Sanz M, Jepsen S, Needleman I, Rolden S. A systematic review on the effect of systemic antimicrobials as an adjunct to scaling and root planing in periodontitis patients. J Clin Periodontol 2002;29 Suppl 3:136-62.
5. Kornman K S. The role of supragingival plaque in the prevention and treatment of periodontal disease. A review of current concepts. J Periodont Res 1986;21 Suppl 16:5-22.
6. Heasman PA, Heasman L, Stacey F, McCracken GI. Local delivery of chlorhexidine gluconate (Periochip ™) in periodontal maintenance patients. J Clin Periodontol 2001;28:90-5.
7. Kinane DF, Radvar M. A six-month comparison of three periodontal local antimicrobial therapies in persistent periodontal pockets. J J Periodontol 1999;70:l-7.
8. Kinane DF, Radvar M. The effect of smoking on mechanical and antimicrobial periodontal therapy. J Periodontol 1997;68:467-72.
9. Lacey RW. Antibacterial activity of povidone iodine towards non-sporing bacteria. J Appl Bacteriol 1979;46:443-9.
10. Rahn R. Review presentation on povidone iodine antisepsis in the oral cavity. Postgrad Med J 1993;69 Suppl 3:S4-9.
11. Vivien B, Niklaus P: Microbiological and clinical effects of an antiseptic dental varnish after mechanical periodontal therapy. J Clin Periodontol 1999;26:341-6.
12. Waker C, Magnusson I. Effect of metronidazole containing dental gel on periodontal microflora. J Dent Res 1995;74:481.
13. Chen YT, Hung SL, Lin LW. Attachment of periodontal ligament cells to chlorhexidine loaded guided tissue regeneration membranes. J Periodontol 2003;74:1652-9.
14. Hoang T, Jorgensen MG, Keim RG, Pattison AM, Slots J. Povidone-iodine as a periodontal pocket disinfectant. J Periodont Res 2003;38:311-7.
15. Garrett S, Johnson L, Drisko CH, Adams DF. Two multi center studies evaluating locally delivered doxycycline hyclate, placebo control, oral hygiene and scaling and root planing in the treatment of periodontitis. J Periodontol 1999;70:490-503.
16. Zanatta GM, Bittencourt S, Nociti FH Jr., Sallum EA, Sallum AW, Casati MZ. Periodontal debridement with povidone-iodine in periodontal treatment: Short-term clinical and biochemical observations. J Periodontol 2006;77:498-505.
17. Brochut PF, Marin I, Baehni P, Mombelli A. Predictive value of clinical and microbiological parameters for the treatment outcome of scaling and root planing. J Clin Periodontol 2005;32:695-701.
18. Fine JB, Harper DS, Gordon JM, Hovliaras CA, Charles CH. Short term microbiological and clinical effects of subgingival irrigation with an antimicrobial mouthrinse. J Periodontol 1994;65:30-6.
19. Piccolomini R, Di Bonaventura G, Catamo G, Tumini V, Di Placido G, D'Ercole S, *et al*. Microbiological and clinical effects of a 1% chlorhexidine gel in untreated periodontal pockets from adult periodontitis patients. Microbiologica 1999;22:111-6.
20. Unsal E, Akkaya M, Walsh TF. Influence of a single application of subgingival chlorhexidine gel or tetracycline paste on the clinical parameters of adult periodontitis patients. J Clin Periodontol 1994;21:351-5.
21. Vinholis AH, Figueiredo LC, Junior EM. Subgingival utilization of a 1% chlorhexidine collagen gel for the treatment of periodontal pockets. A clinical and microbiological study. Braz Dent J 2001;12:200-13.
22. Rosling BG, Slots J, Christersson LA, Grondahl HG, Genco RJ. Topical antimicrobial therapy and diagnosis of subgingival bacteria in the management of inflammatory periodontal disease. J Clin Periodontol 1986;13:975-81.
23. Badersten A, Nilveus R, Egelberg J. Effect of nonsurgical periodontal therapy. I. Moderately advanced periodontitis. J Clin Periodontol 1981;8:57-72.

How to cite this article: Arun Sivadas, Preeja C, Presanthila Janam. Comparative Evaluation of Topical Chlorhexidine Gluconate Gel and Povidone Iodine Ointment as an Adjunct to Initial Therapy of Chronic Periodontitis. Int J Sci Stud 2021;9(5):47-55.

Source of Support: Nil, **Conflicts of Interest:** None declared.